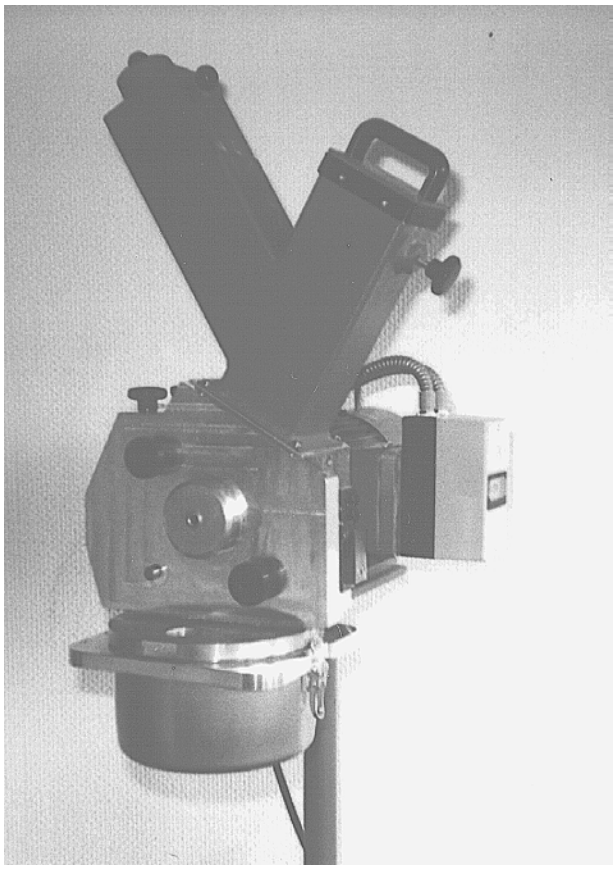
FRITSCH

Operating Instructions

Laboratory - Cutting Mill „ pulverisette 15 “



Fritsch GmbH
Manufacturers of
Laboratory Instruments

CE

Contents **Page**

Operator´s Manual: January 10. 1996 (Valid from Ser. Number ...1000)

FRITSCH GmbH
Manufacturers of
Laboratory Instruments
Industriestraße 8
D - 55743 Idar-Oberstein

Telephone 06784 700
Fax 06784 7011
Telex 426203 fritsd
E-Mail: 067847024-0001@t-online.de

On June 24, 1995,
Fritsch GmbH was certified by the TÜV-Zertifizierungsgemeinschaft e.V.

An audit was conducted (Report No. Q94/107) to verify that Fritsch meets the requirements of

DIN ISO 9001 / EN 29001
(Certificate No. 71 100 4 008)

Safety Instructions
Application and Use

						
Combustible materials	**Materials detrimental to health**	**Caution**	**Warning of dangers**	**Danger electrical power**	**Wear eye protection**	**Wear ear protection**

This operators manual describes the area of application and the use of the cutting mill.

Any other use than for cutting with the parts manufactured by us **is impermissible**.

Modification may be made to the mill only after consultation with and written approval from Fritsch. If the modifications are made without approval, the conformity declared by Fritsch in respect of the European directives will no longer apply.

- **Do not remove information signs.**
- **Allow only trained personnel to perform maintenance.**
- **Replace covers after maintenance.**
- **Do not permanently disable safety devices.**
- **Check safety device regularly.**
- **"Out of Service" ⇒ Turn off master switch.**
- **Allow only trained specialists to work on the mill.**
- **Do not open cutting mill until it is completely stopped.**
- **Do not put your hands into mill while it is running.**
- **Always wear safety glasses when working.**

- **Set up the cutting mill indoors only.**
- **Ambient temperature 0 to 40°C**
- **Set it up on the stand or a sturdy work table.**
- **Dimensions on the stand: 1450 x 620 x 580 mm (H x W x D)**
- **Dimensions on the table: 750 x 360 x 520 mm (H x W x D)**
- **Weight (net): approx. 40 kg**

- **Noise level: 99 dB**

- **Danger: Electricity:**
  The Mill contains a switching device with electricity in the low voltage range 230 resp. 400 Vrms

Attention: Remove flange carefully and open both bent levers simultaneously.

- **Exercise caution when working with combustible or poisonous materials.**

Always comply with valid safety regulations (MAC values) when handling samples which are dangerous to your health and, where applicable, set up mill in a well-ventilated safety zone.

- **Be careful knives are sharp and may cause injury.**
- **Be careful not to be pinch yourself on the chute.**
- **Be careful not to squeeze yourself on the bent levers.**

- **Read and comply with Operator's Manual**

Operating Instructions

Laboratory - Cutting Mill

„ pulverisette 15 “

The "pulverisette 15" is a universal laboratory cutting mill for high-speed comminution of soft to medium-hard and fibrous materials.

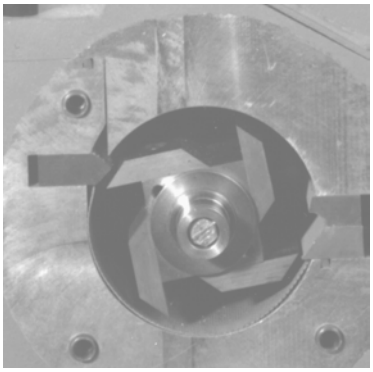
Sheet rubber	leather	paper	cardboard	textiles	roots
animal fodder	wood	peat	leaves	straw	tobacco
non-metallic waste	coal	fibres	corn grain	pets	plastics
confectionery goods	malt	spices	dragées	tablets	
farinaceous products	bones	horn	dried meat	etc.	

The maximum feed size of relatively hard material is about 60 mm.

Maximum feed quantity is about 800 ml.

Average final fineness is between 0.25 and 10 mm, depending on the sieve.

1 Method of Operation



The material to be cut passes through a hopper with chute and pusher to a position in front of a ram which feeds the material into the cutting chamber. In this chamber, the material is cut by 4 rotating knives and 3 stationary knives. A sieve insert closes off the bottom of the cutting chamber. The milled material passes through this insert and into a receptacle.

2 Operating Safety

The laboratory cutting mill features an extensive safety system:

1. During operation **one safety switch** monitors the closing of the front cover and prevents the mill from being put into service whenever the cover is open.

   ⇒ Cutting mill will not start while cover is open.

1. During operation **a second safety** switch monitors the seating of the receptacle for the material to be cut (3.5 litre pot or 30 litre vessel) and prevents the mill from being put into service while no receptacle is in place.

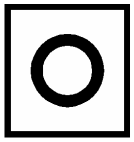
   ⇒ Cutting mill will not start while receptacle is open.

Both switches meet the guidelines for personnel protection.

The safety switches <u>do not lock</u> receptacle and cover:

Whenever receptacle or cover is removed, the drive motor immediately comes to a stop (brake motor).

After the STOP button is pressed
the mill brakes: complete stop in seconds.
⇒ Receptacle can be removed.
⇒ Cover can be opened.



An A.C. power failure during operation
brakes the mill: complete stop in seconds
⇒ Receptacle can be removed.

The mill does not restart when the power returns.
⇒ Mill is protected against restart.
⇒ Press the **START** button: mill will start.

Whenever the cutting mill is not operated for a protracted period:

⇒ Shutdown at night: disconnect mill from A.C. power

3 Installing the Laboratory Cutting Mill

Attention: Set up the cutting mill before connecting it to A.C. power.

Set up the cutting mill indoors

1. on a stable table and screw the flange to the table top so that the top flange projects over the edge of the table, or

2. screw the cutting mill to your stand so that it is mounted above the two stand legs.

Room temperature must be between 0° to 40°C.
Make certain that mill is readily accessible.
Do not block the air discharge vent at the back.

4 Electrical Connection

- 1~ 115 V / 230 V 6 10%; 50...60 Hz with PE conductor

  2400 / 2200 watts of power consumed under high load
  (markedly lower during normal use)
  100 to 120 V fuse max. 32 A;
  200 to 240 V fuse max. 16 A.

- 3~ 230 V / 400 V 6 10%; 50...60 Hz with PE conductor

  2000 watts of power under high stress
  (markedly lower during normal use)
  230 / 400 V fuse 16 A

4.1 Adapting the Laboratory Cutting Mill to the A.C. Power Supply

Permit only a trained professional to switch the supply voltage from 230 to 280 V and/or change the connecting cable (see "Technical Documentation").

4.2 Drive Motor

Driven by 1~120 V Motor or
1~230 V Motor or
3~230 / 400 V Motor.

The drive motors are "brake motors" which come to a complete stop in a minimum of time after shutdown. When the A.C. power is switched off, a mechanical brake blocks the motor.

4.2.1 Direction of motor rotation

The 3~ A.C. motor must rotate to the left as viewed when looking at drive side from above; in anti-clockwise direction as viewed from the front of cutting mill; in clockwise direction as viewed from behind - through the air vent of motor).

The direction of rotation of the 1~ A.C. motor has been set to anti-clockwise at the factory.

See DIN VDE 0530, Part 8,
"Designation of Connection and Direction of Rotation"
DIN VDE 0530, Part 7 / EN 60 934-7,
"Identification Symbols for Models"

If the direction of rotation of the 3~ A.C. motor must be changed, this can be done by swapping two feed lines "L1, L2, L3" (or the supply leads "U1, U2, U3" in the appliance outlet).

Permit only a trained professional to change the direction of rotation.

The direction of rotation of the 1~ A.C. model cutting mill was set to anti-clockwise at the factory.

5 Operation of the Laboratory Cutting Mill

5.1 Installing the Sieve

To install the sieve, remove the front cover and
either push the sieve in from the front
or loosen the star grips on the left-hand side,

swing up the top half of the housing and put in the sieve.

Close top half of housing and tighten with star grips.

Check that tapered guides on cutting rotor and cover are clean.

Place front cover on guide pin and securely tighten with knurled screws - safety switch will lock in place.

5.2 Checking the Cutting Gap

The rotating knives are never to touch the stationary knives - a gap has been set between them at the factory:

0.2 - 0.3 mm for knives 1
0.2 - 0.3 mm for knives 2
0.2 - 0.3 mm for knives 3

The rotating knives must be aligned so that they are parallel to the counter knives.
To turn the rotor, pull motor brake lever forward. Turn cutting rotor by hand.

⇒ **Caution: Knives are sharp and may cause injury** ⇐

(For setting, removal and installation of knives: see Section 7, "Maintenance".)

5.3 Procedures Before Switching On the Cutting Mill

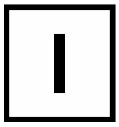
- Before closing the front cover
  - make certain that cutting rotor and sieve are securely seated,
  - clean tapered guide on cutting rotor,
  - clean tapered guide in front cover.
- Place front cover on guide pin and fasten securely with knurled screws; safety switch will lock in place.
- Hang flange of receptacle for the material to be cut (3.5 litre pot or 30 litre vessel) in the bent lever closures and close both bent levers simultaneously.

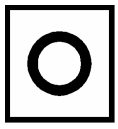
Watch for heating of the material to be cut. If necessary, take a break while it cools.

5.4 Start-Up of Laboratory Cutting Mill

Note: First turn cutting mill on and then feed in the material to be cut.

To turn on: Press **START** button - **to turn off:** Press **STOP** button**.**

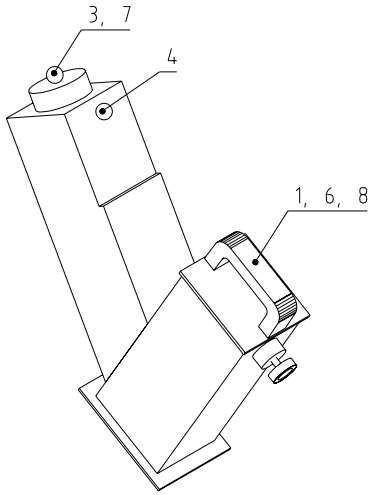




5.5 Feeding the Material to be Cut

Note: First turn cutting mill on and then feed in the material to be cut.

1. Slide in wooden ram.
2. Turn on cutting mill.
3. Pull back pusher.
4. Open chute.
5. Feed in material to be cut.
6. Carefully pull wooden ram up to the stop.
7. Push material in front of ram with pusher.
8. Slowly lower the ram, pushing material into cutting chamber.



Feed in no more material that can be processed without impairing the function. Feeding excessively large quantities could cause blockage of the laboratory cutting mill.

Check the cutting gap before restarting (see Section 5.2).

6 Cleaning the Laboratory Cutting Mill

Open the laboratory cutting mill:

- Loosen knurled screws on front cover

– remove front cover.

- Loosen star grips on upper half of housing

– swing upper housing up to the right.

- Remove the sieve.

Thoroughly clean the entire inside of the laboratory cutting mill with brushes and suction unit.

⇒ **Caution**: Knives are sharp and may cause injury⇐

7 Maintenance

Before starting maintenance work, disconnect the laboratory cutting mill from the A.C. power:

Pull out the power plug and secure unit against accidental re-starting (possibly use warning sign to indicate maintenance work in progress).

Component	Function / Type	Check	Maintenance period
Safety switch 1 (Activated when cover set in place)	Starting lockout	Cover removed: ON button does not engage	Before each use (Exchange fault switch)
Safety switch 2 (Activated when housing set in place)	Starting lockout	Housing open: ON button does not engage	Before each use (Exchange fault switch)
Tapered guides on cutting rotor and cover	Guidance of rotor	Contamination	Before each use
Cutting gap between cutting rotor and cover	Cutting function	Check distance	Visual inspection before each use
Cutting gap between cutting rotor and stationary knives	Cutting function	Check distance	Dimension check every 500 hours
Rotatable bearings	Permanent lubrication	Bearing clearance	every 2,000 hours
Drive motor	Permanent lubrication	Bearing clearance	every 4,000 hours
Drive motor	Braking time Brake lining	Breaking time >5s exchange breaking lining	every 4,000 hours
Silicon rubber gasket for cover	Gasket	Deformation and contamination	Before each use

7.1 Installing and Removing the Cutting Knives

The rotating knives will have to be turned or, like the stationary knives, reground or exchanged depending on the material cut and the duration of use.

Installing and removing the rotating knives
Open the upper half of the housing to remove the rotating knives. They will then be freely accessible. Use a 6 mm hex wrench to loosen the fastening screws.

(To turn the cutting rotor, pull brake lever on motor forward while carefully turning the cutting rotor.)

During installation, first align only one knife so that it is parallel to the edge of the rotor and screw it on tight.

⇒ This knife is use to set the stationary knives.

The other 3 rotating knives are not mounted until after the stationary knives are fixed in place. They are then aligned to the left-hand stationary knife (gap of 0.2 to 0.3 mm between the cutting edges) and screwed on tight.

Installing and removing the stationary knives
To **remove** the stationary knives, loosen the middle retaining screw in each and pull out the knives.

At least 1 rotating knife must be securely installed before **installing** the stationary knives.

- **The knife on the left-hand side** is held in position with the middle retaining screw and the two outside pressure screws.

  Set the cutting gap between this knife and the securely mounted rotating knife to 0.2 to 0.3 mm (a sheet of 80 g typing paper folded once).
- **Hold the top knife on the right-hand side** in position with the middle retaining screw and the 2 outside pressure screws.

  Set the cutting gap between this knife and the securely mounted rotating knife to 0.2 to 0.3 mm (a sheet of 80 g typing paper folded once).
- Hold the **bottom knife on the right-hand side** in position with the middle retaining screw and the 2 outside pressure screws.

  Set the cutting gap between this knife and the securely mounted rotating knife to 0.5 mm (a sheet of 80 g typing paper folded twice). Never set a smaller gap here.

Important: After the stationary knives are set, it is imperative that the retaining screws be securely tightened.

Once the stationary knives have been fixed in position, the other 3 rotating knives are installed and securely tightened (see above).

8 Checklist for Troubleshooting

Malfunction	Possible cause	Remedy
Laboratory cutting mill will not start	Not plugged into A.C. power	Insert A.C. power plug
	Safety switch 1 open	Place cover on correctly
	Safety switch 2 open	Close housing correctly
Mill stops during operation	Motor overheating	Check fan, let mill cool down
	Overload, turned off by motor protection switch	Cool mill down, remove material to be cut, reduce amount of material fed in
Material poorly ground	Wrong direction of rotation	Check direction of rotation: anti-clockwise looking at drive side from above
Material being ground leaks out	Cover not sealed	Exchange gasket
	Clamping screw loose	Tighten clamping screw
	Gasket faulty	Exchange gasket
Untrue running with strong vibration	Uneven setting of knives on cutting rotor	Adjust cutting rotor knives
	Cutting rotor contaminated	Clean cutting rotor
	Legs not uniformly positioned	Adjust to secure footing
	Wrong direction of rotation	Check direction of rotation: anti-clockwise looking at drive side from above

9 Warranty

The warranty card enclosed with this shipment must be returned to the supplier completely filled out in order for the warranty to take effect.

Fritsch GmbH of Idar-Oberstein and our "Application technology laboratory" and/or our agent in your country will be glad to advise and aid you.

In order to answer any questions you may have, we will require the serial number stamped on the nameplate.

ERSATZTEILLISTE NR. 19 Listdatum : JAN 4, 1996 V-35

SCHNEIDMÜHLE
"PULVERISETTE 15"

POS POS	ARTIKEL-NR ARTICLE NO.	ARTIKELBEZEICHNUNG ITEM DESIGNATION	PREIS PRICE
1	15.372.00	HOUSING CPL.	
2	15.331.09	LEFT HINGE P-15	
3	15.332.09	RIGHT HINGE P-15	
4	91.514.09	CYL.HEAD SCREW M8x25, BLACK	
5	92.183.09	COUNTERSUNK SCREW M8x30	
6	92.923.09	INSERT NUT M8, 9mm	
7	92.935.09	GEWINDEEINSATZ M12x22 STAHL	
8	15.350.09	LEFT HOLDING SHACKLE	
9	15.351.09	RIGHT HOLDING SHACKLE	
10	15.375.00	PRODUCT CONTAINER	
11	15.260.00.0	RECEPTACLE 3.5 LITRES	
[illegible]	93.920.00	BENT LEVER CLOSURE FOR 15.260.00	
[illegible]	15.232.16	SPACER BLOCK F/PRODUCT CONTAINER	
14	15.370.13	RECEPTACLE FIXING FLANGE	
15	15.373.00	LID CPL.	
16	15.374.00	BEARING SYSTEM, CPL.	
17	15.368.10	LID BEARING FLANGE	
18	91.518.09	ZYL.SCHRAUBE M8x16 DIN 7984	
19	93.111.09	TELLERFEDER di=25,4/da=50/t=1,25	
20	15.365.10	BEARING DISK	
21	82.517.00	BALL BEARING 6205-2 RS1	
22	93.726.09	SICHERUNGSRING 52x2 DIN 472	
23	15.363.10	SUPPORT BEARING CONE	
24	15.367.13	LID FOR SECURITY SWITCH	
25	82.807.00	PLAIN BEARING BUSH 10/10mm	
26	82.811.00	DU-BUCHSE da=14/di=12/l=15	
27	91.597.09	WASHER 8.4 DIN 433	
28	15.371.10	LID FIXING SCREW	
29	92.620.00	KORDELGRIFF M6	
30	84.042.15	DICHTRING DECKEL P-15/P-25	
[illegible]	91.208.10	CYLINDER HEAD SCREW M4x8	
[illegible]	15.364.09	ROTOR WITH INNER CONE	

ERSATZTEILLISTE NR. 19 Listdatum : JAN 4, 1996 V-35

SCHNEIDMÜHLE
"PULVERISETTE 15"

POS POS	ARTIKEL-NR ARTICLE NO.	ARTIKELBEZEICHNUNG ITEM DESIGNATION	PREIS PRICE
33	15.320.00	FEEDING DEVICE, CPL.	
34	15.336.00	BRUSH PROFILE L = 105mm	
35	15.318.00	WOODEN PLUNGER, CPL.	
36	15.361.16	PLASTICS PLUNGER	
37	15.323.09	PESTLE COVER	
38	92.613.00	BOW-TYPE HANDLE	
39	92.157.09	COUNTERSUNK SCREW M6x12	
40	92.157.09	COUNTERSUNK SCREW M6x12	
41	15.335.09	SECURING PLATE FOR PLUNGER	
42	91.263.09	COUNTERSUNK SCREW M4x20	
43	15.330.10	SLIDER BAR	
[illegible]	15.329.13	SLIDER PLATE	
[illegible]	92.602.16	SPHERICAL KNOB, M6	
46	15.328.13	SLIDER GUIDE FOR HOPPER P-15	
47	82.807.00	PLAIN BEARING BUSH 10/10mm	
48	91.285.09	CYLINDER HEAD SCREW M4x30	
49	91.273.09	COUNTERSUNK SCREW M4x5	
50	15.339.16	COVERING STOPPER FOR EXHAUST OP.	
51	93.310.09	SPRING THRUST PIECE M5	
52	93.308.09	SPRING THRUST PIECE M8	
53	91.419.09	LINSENSCHRAUBE M6x12 DIN 7985	
54	92.506.00	STAR GRIP SCREW P-15, M8	
55	15.366.13	SECURITY SWITCH F/RECEPT. FLANGE	
56	15.369.09	ROTOR SECURITY DISK	
57	15.324.10	CENTERING FLANGE P-15	
58	15.325.00	PULLING-OFF DEVICE FOR ROTOR P-15	
59	84.013.15	WASHER 162x4mm, PERBUNAN	
60	15.333.16	SEALING PVC FOR RECEPTACLE FLANGE	
61	45.123.10	SIEVE INSERT P-15, TRAPEZ. 1.0mm	
62	45.400.00	SET = 4 ROTATING KNIVES P-15	
[illegible]	45.401.09	ROTATING KNIFE P-15	
64	45.410.00	SET = 3 FIXED KNIVES P-15	

ERSATZTEILLISTE NR. 19 Listdatum : JAN 4, 1996 V-35

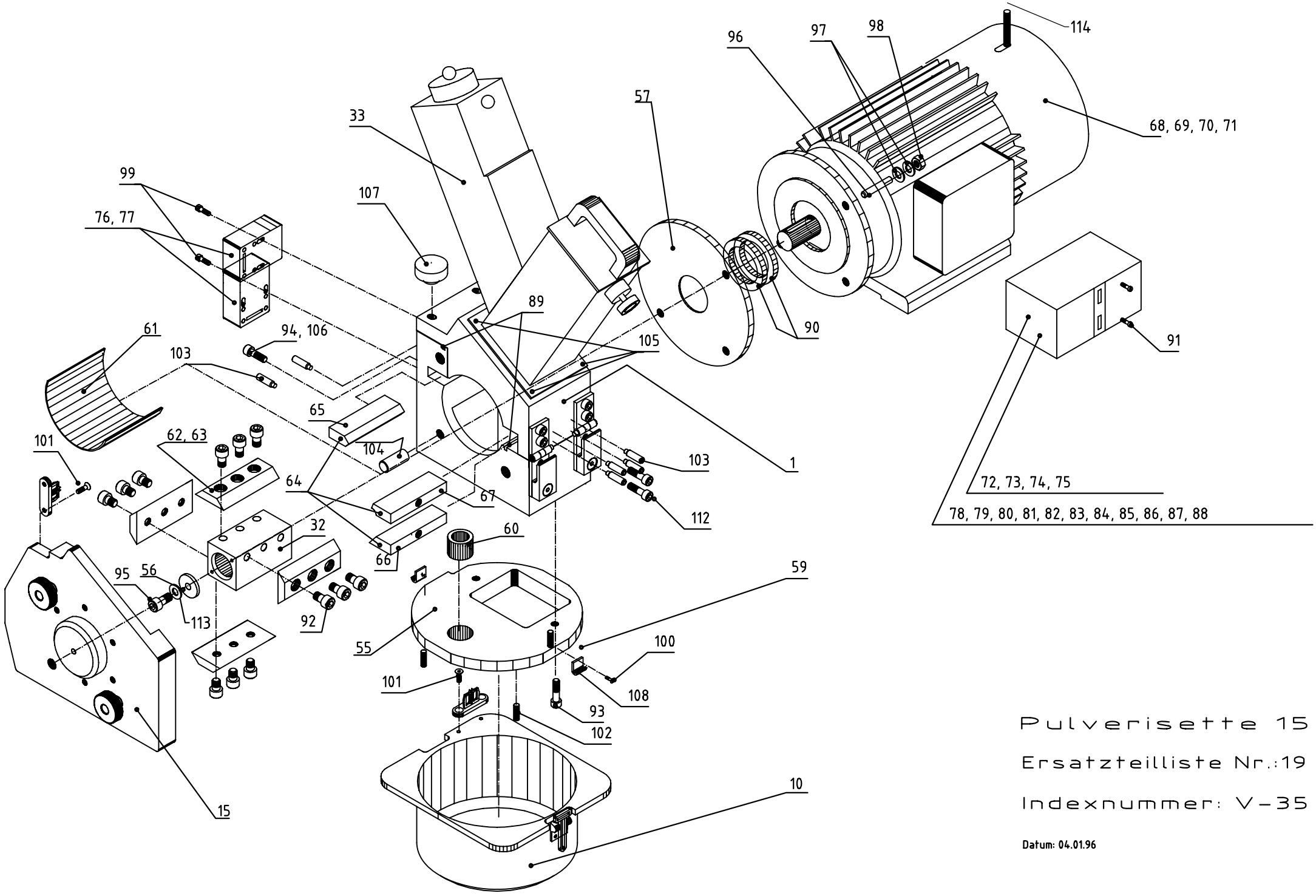
SCHNEIDMÜHLE
"PULVERISETTE 15"

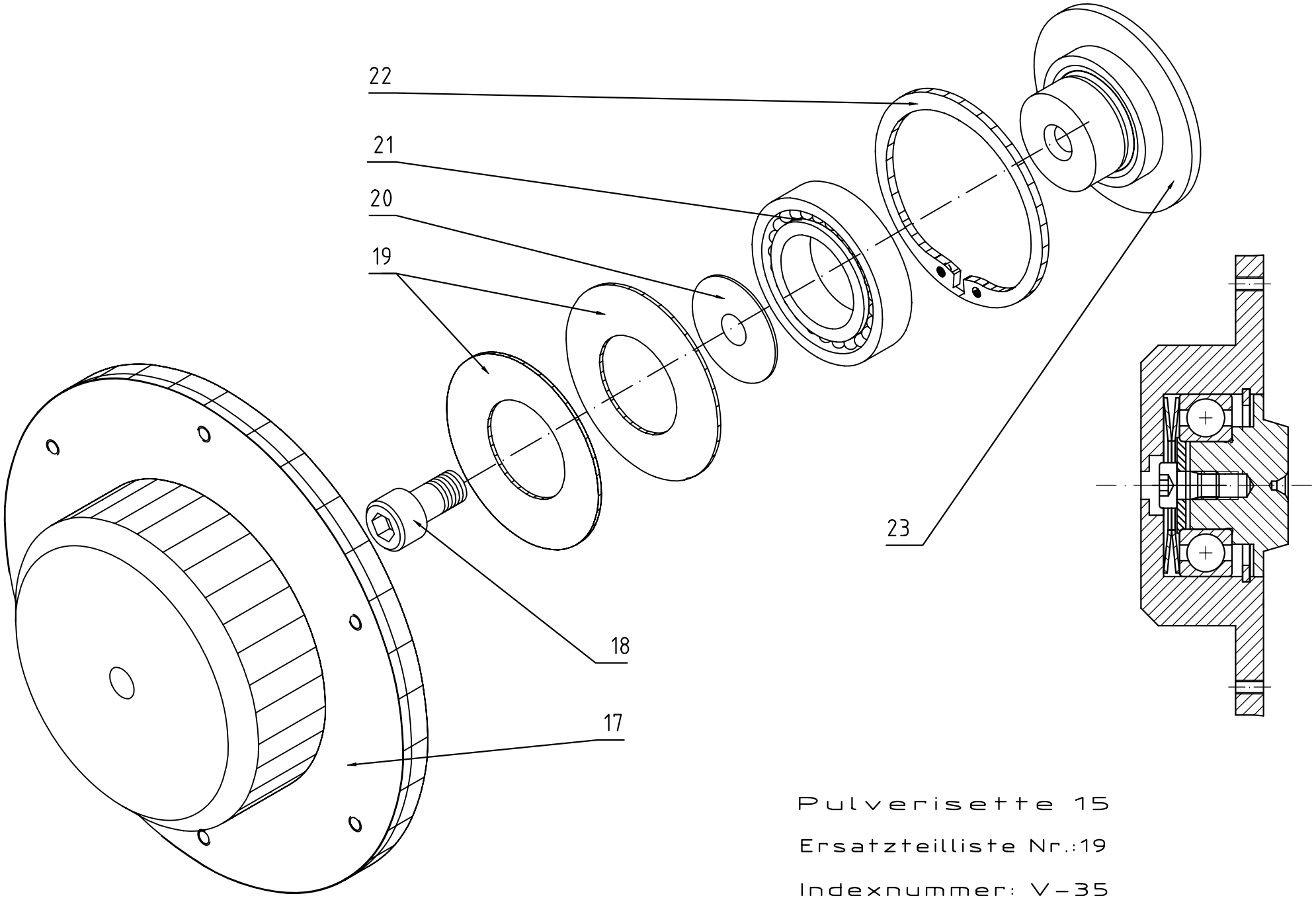
POS POS	ARTIKEL-NR ARTICLE NO.	ARTIKELBEZEICHNUNG ITEM DESIGNATION	PREIS PRICE
65	45.411.09	MESSER 1, P-15	
66	45.412.09	MESSER 2, P-15/P-25	
67	45.413.09	MESSER 3, P-15/P-25	
68	81.217.00	BREMSMOTOR P-15 230V 1-phase	
69	81.218.00	BREMSMOTOR P-15 100-120V/50-60Hz	
70	81.216.00	BREMSMOTOR P-15 230/400V 3-phase	
71	81.213.00	BREMSMOTOR P-15 240V/60Hz 1-phase	
72	86.524.00	MOTORSCHUTZ 230V Ws, P-15	
73	86.507.00	MOTOR PROTECTION 110V AC P-15	
74	86.504.00	MOTOR PROTECTION 380V 3PH. P-15	
75	86.505.00	MOTOR PROTECTION 220V P-15	
76	81.435.00	SICHERHEITSSCHALTER AZ 15 zv	
77	81.421.00	SCHLITZVERSCHLUß FÜR AZ 16	
78	81.633.16	WINKEL-SCHLAUCHVERSCHRAUBUNG PG11	
79	81.643.16	KABELSCHUTZROHR PG11, SCHWARZ	
80	81.644.16	KLEMMSCHELLE PG11	
81	81.645.16	DECKEL FÜR KLEMMSCHELLE, SCHWARZ	
82	81.646.16	SCHLAUCHVERSCHRAUBUNG PG11	
83	81.730.00	GUMMIKABEL 3x1,5	
84	81.751.00	KABEL 3x2,5 SCHWARZ	
85	81.702.00	KABEL 3x0,75 SCHWARZ	
86	81.705.00	STECKER 220V	
87	81.610.00	KABEL MIT STECKER 110V	
88	86.009.00	CEE-STECKER 5-polig 16A	
89	84.304.15	SOFT RUBBER SEAL 4x7mm	
90	84.421.24	FILZRING, HÄRTE M5	
91	91.211.09	CYLINDER HEAD SCREW M4x10	
92	91.510.09	ZYL.SCHRAUBE M8x12 DIN 912	
93	91.515.09	CYLINDER HEAD SCREW M8x30	
94	91.516.09	CYLINDER HEAD SCREW M8x40	
95	91.512.09	CYLINDER HEAD SCREW M8x16	
96	92.114.09	GEWINDESTIFT M10x55 DIN 913	

ERSATZTEILLISTE NR. 19 Listdatum : JAN 4, 1996 V-35

SCHNEIDMÜHLE
"PULVERISETTE 15"

POS POS	ARTIKEL-NR ARTICLE NO.	ARTIKELBEZEICHNUNG ITEM DESIGNATION	PREIS PRICE
97	91.992.09	SICHERUNGSSCHEIBE M10	
98	91.690.09	SECHSKANTMUTTER M10 DIN 934-8	
99	91.313.09	CYLINDER HEAD SCREW M5x20	
100	91.160.09	COUNTERSUNK SCREW M3x8	
101	92.136.09	COUNTERSUNK SCREW M5x12	
102	92.110.09	ZYL.STIFT 6m6x20 DIN 6325	
103	92.193.09	HEADLESS PIN M8x30	
104	92.316.09	ZYL.STIFT 12m6x50 DIN 6325	
105	91.413.09	CYLINDER HEAD SCREW M6x20	
106	91.595.09	WASHER 8,4	
107	92.506.00	STAR GRIP SCREW P-15, M8	
108	93.921.00	CLAMPING HOOK	
109	83.412.00	HEXAGON WRENCH WITH GRIP, SIZE 6	
110	83.421.00	HEXAGON WRENCH SIZE 4	
111	83.422.00	HEXAGON WRENCH SIZE 5	
112	92.160.09	CYLINDER HEAD SCREW M8x35	
113	91.991.09	SICHERUNGSSCHEIBE M8	
114	92.509.00	ZYLINDERKNOPF P-15	


114
96
97
98
68, 69, 70, 71
57
33
99
107
76, 77
89
90
105
91
61
94, 106
103
65
104
1
103
101
62, 63
64
67
112
72, 73, 74, 75
78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88
32
60
66
59
95
56
113
92
55
100
101
108
93
102
10
15
Pulverisette 15
Ersatzteilliste Nr.:19
Indexnummer: V-35
Datum: 04.01.96

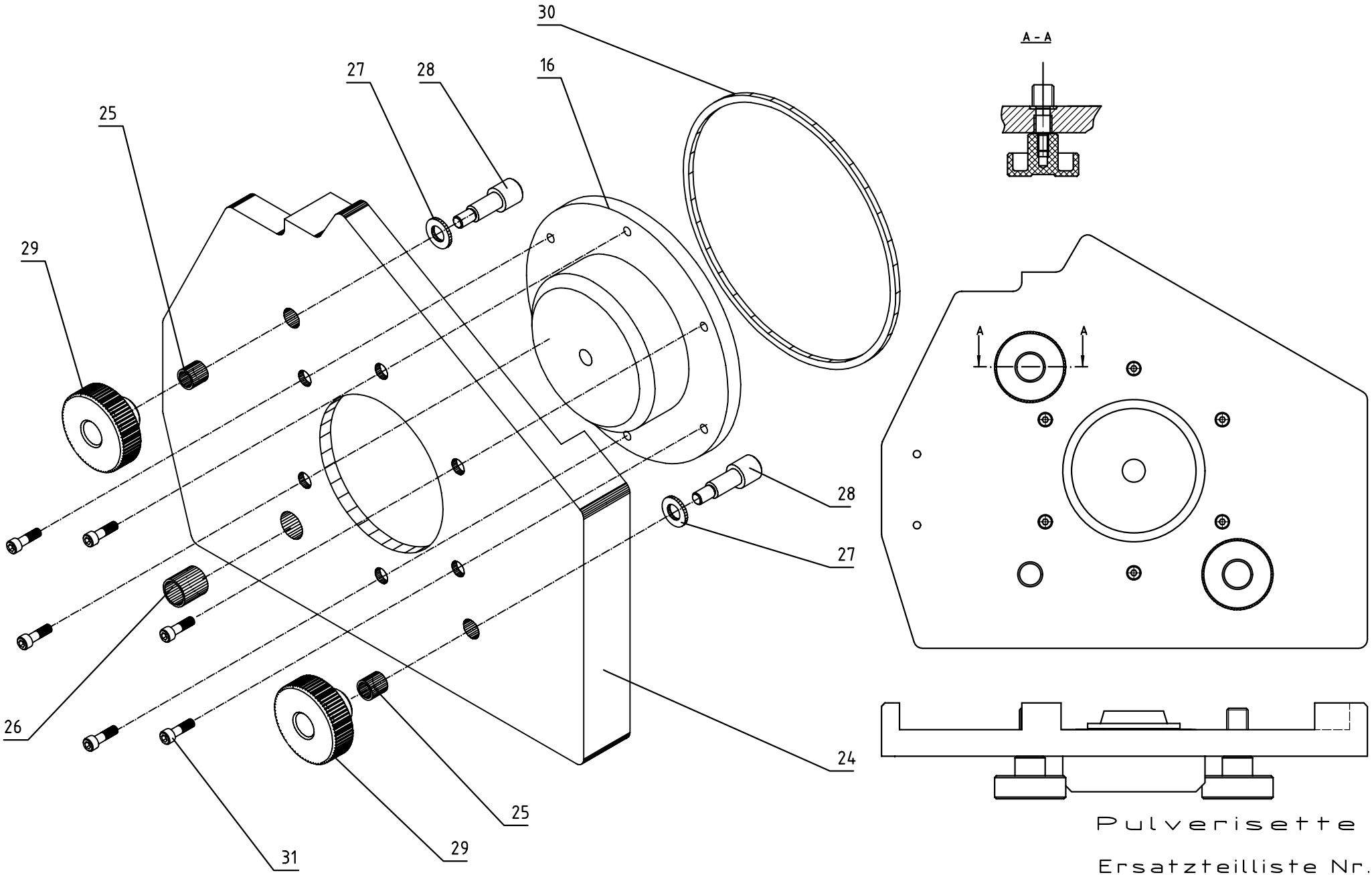


Pulverisette 15

Ersatzteilliste Nr.:19

Indexnummer: V-35

Datum: 04.01.96

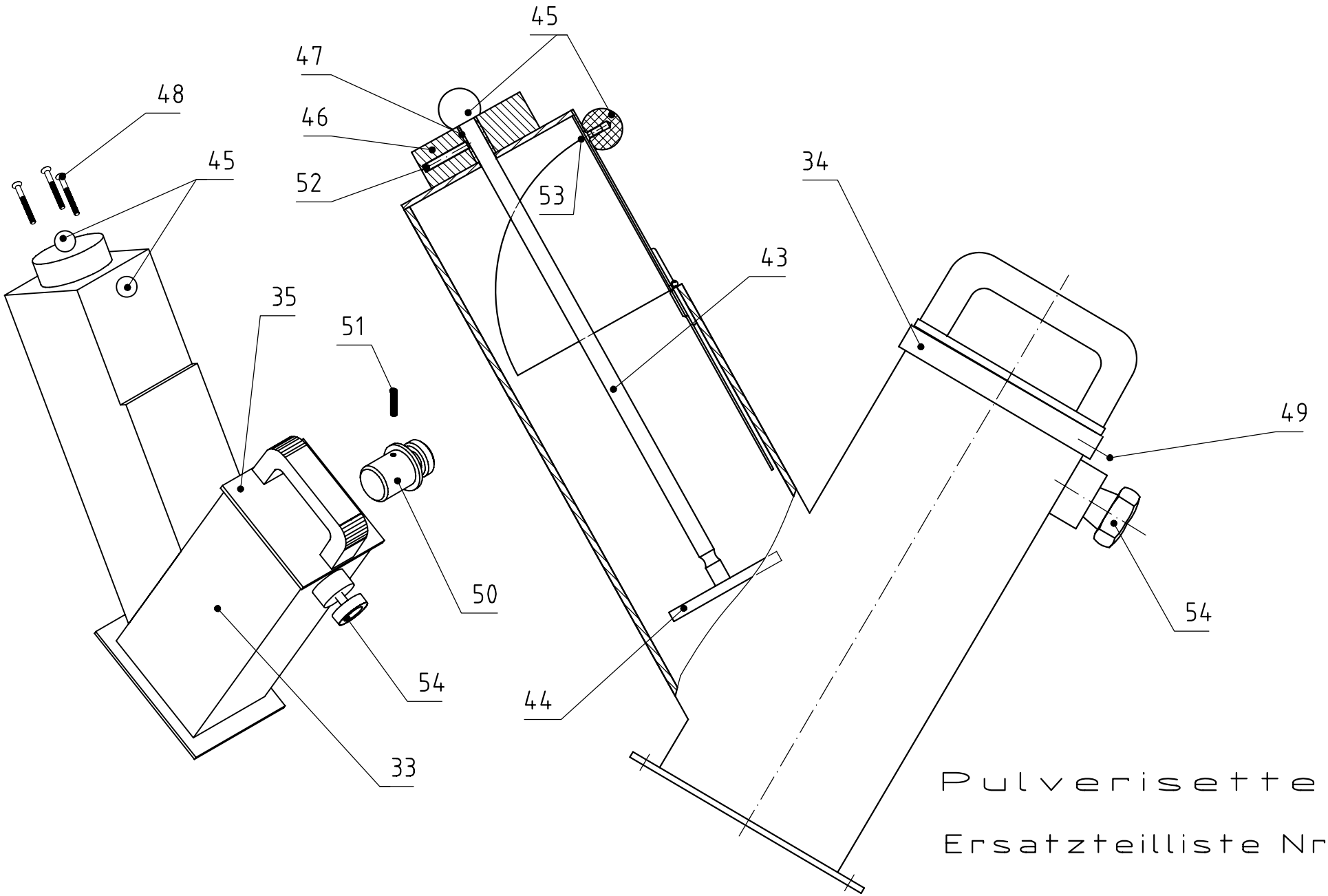


Pulverisette 15

Ersatzteilliste Nr.:19

Indexnummer: V-35

Datum: 04.01.96

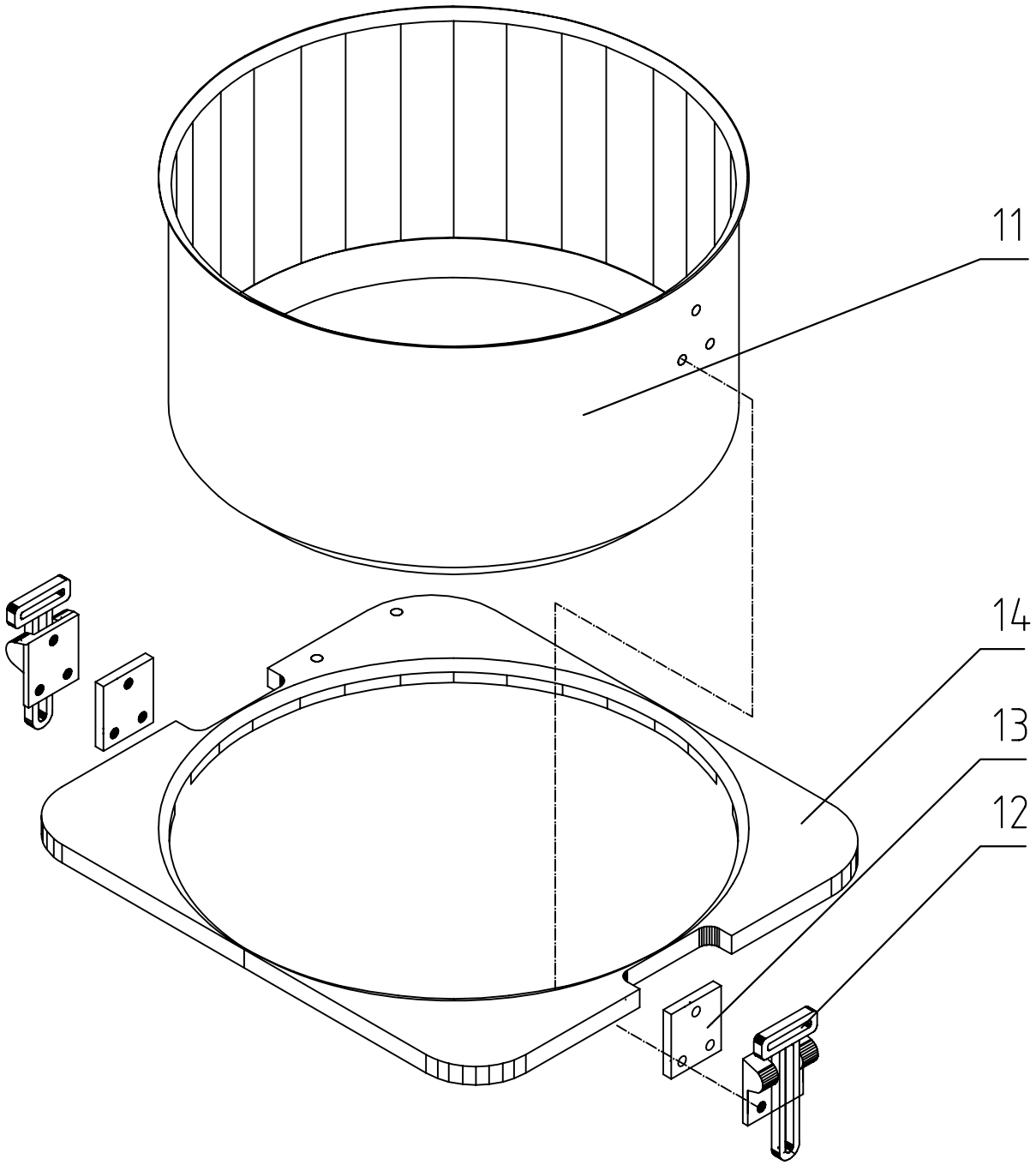


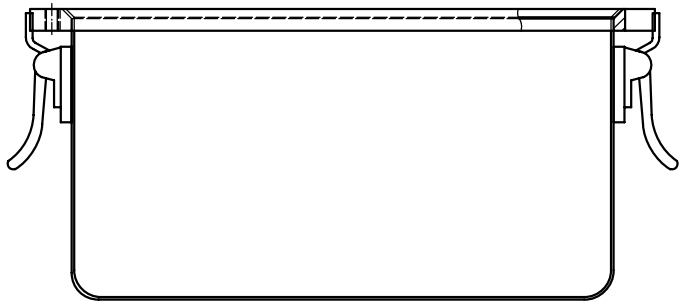
Pulverisette 15

Ersatzteilliste Nr.:19

Indexnummer: V-35

Datum: 04.01.96



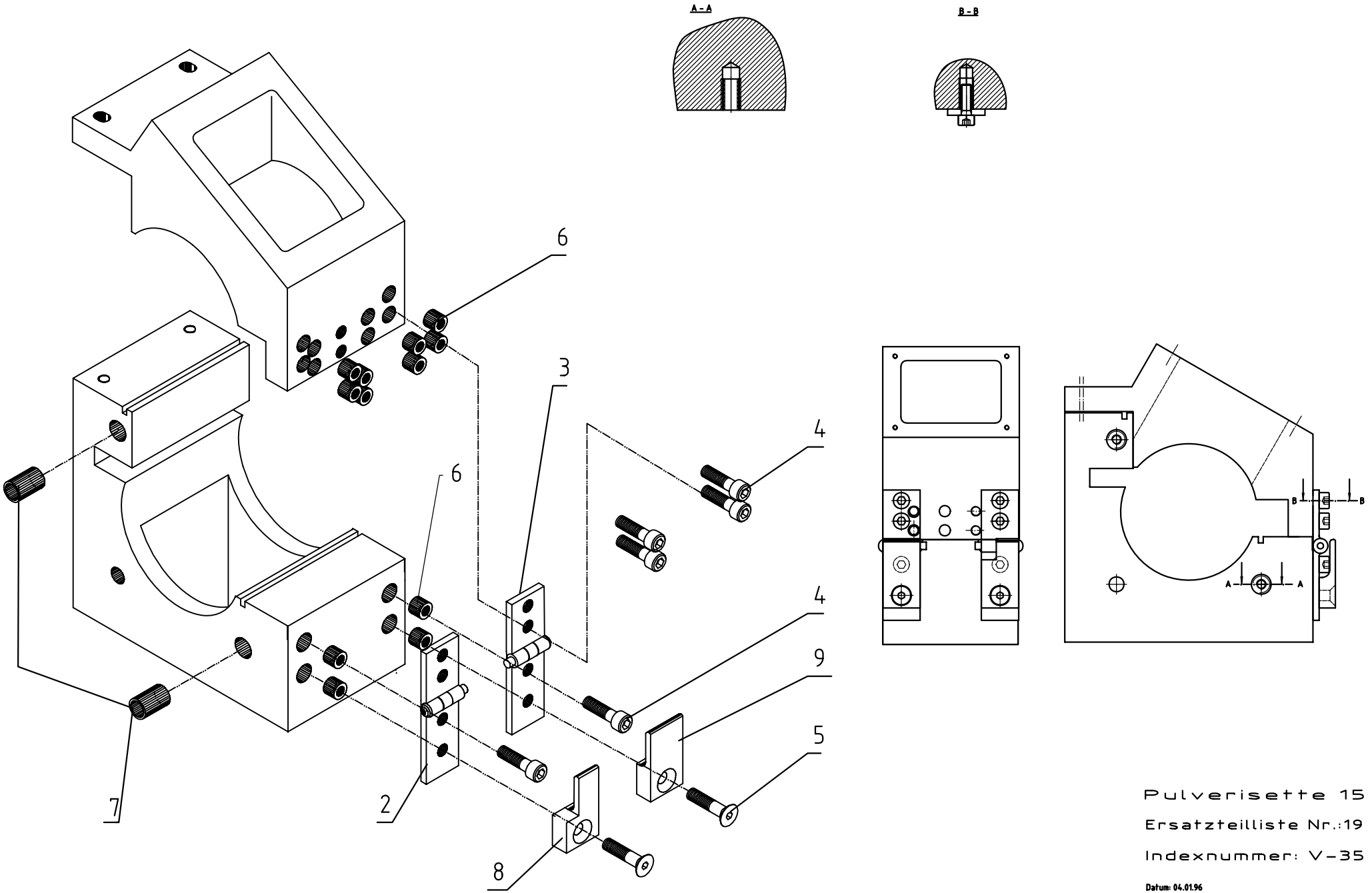


Pulverisette 15

Ersatzteilliste Nr.:19

Indexnummer: V-35

Datum: 04.01.96

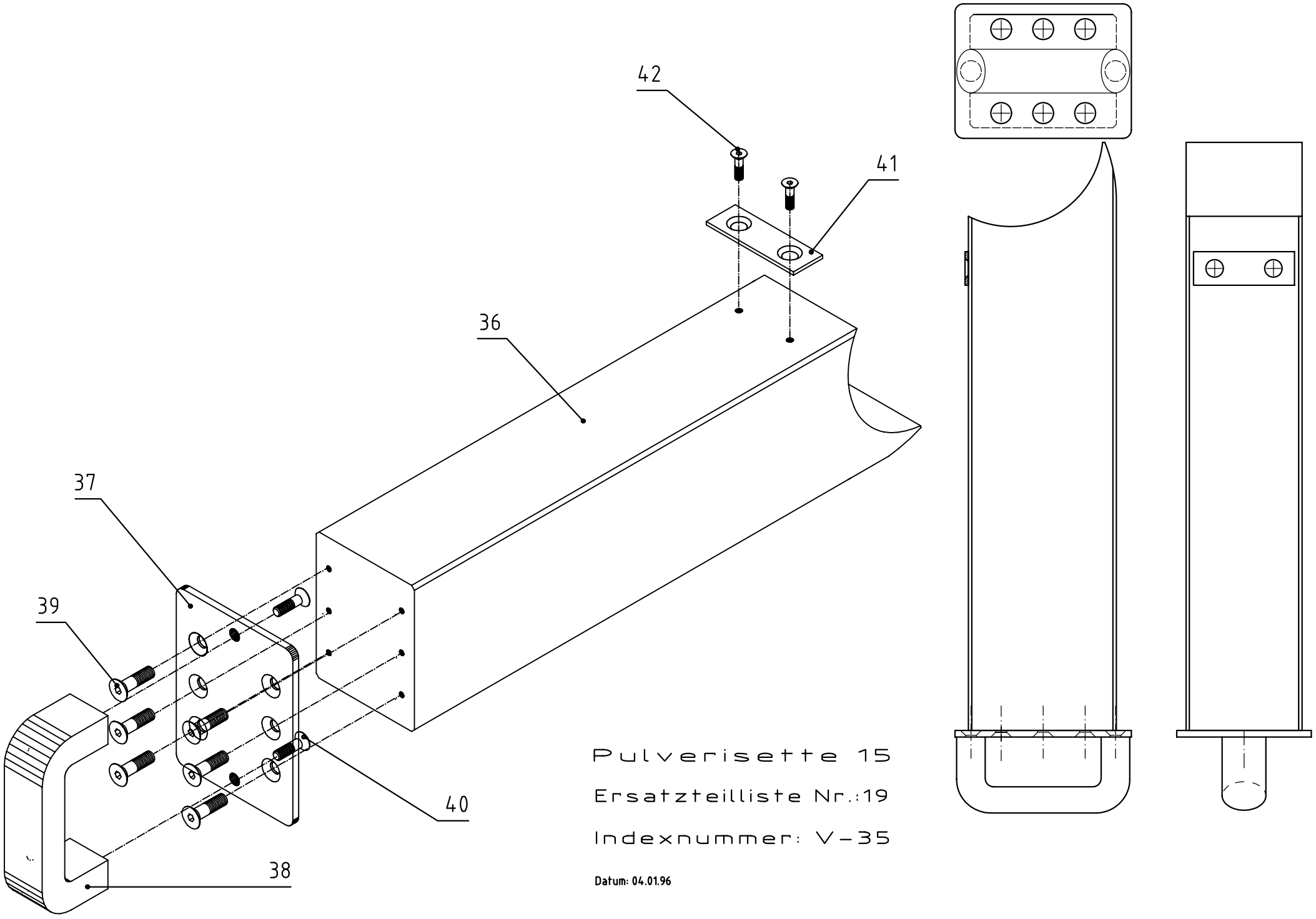


Pulverisette 15

Ersatzteilliste Nr.:19

Indexnummer: V-35

Datum: 04.01.96

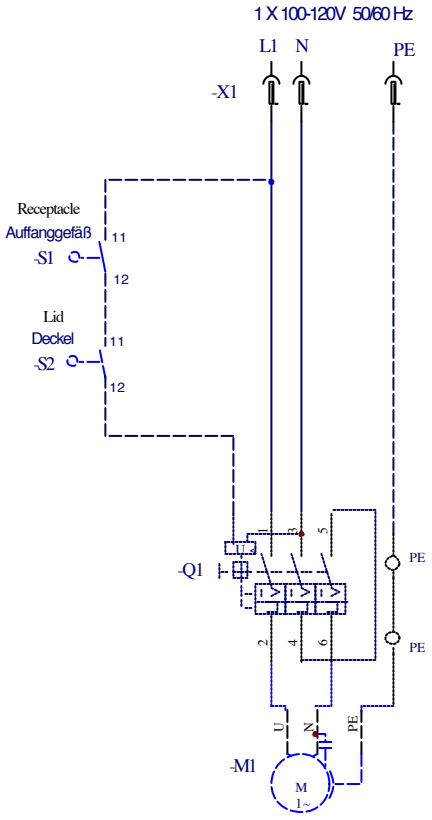


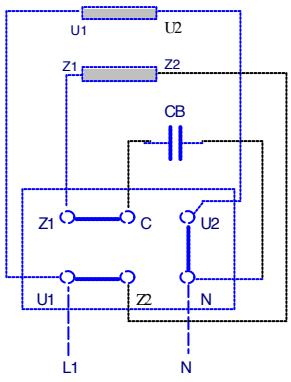
Pulverisette 15

Ersatzteilliste Nr.:19

Indexnummer: V-35

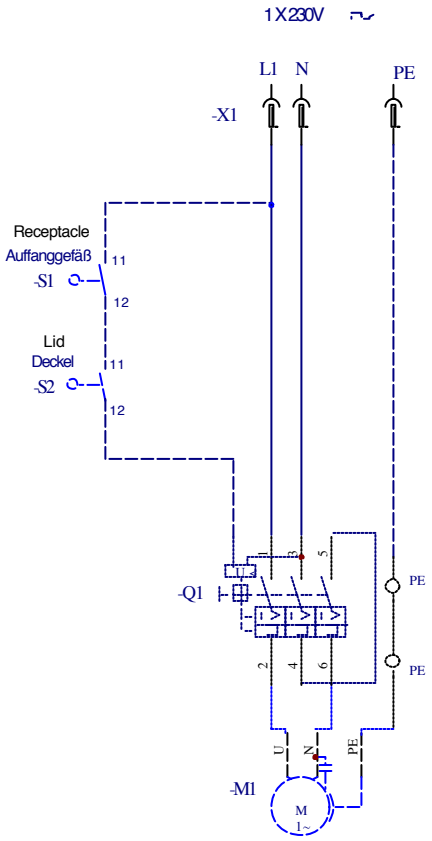
Datum: 04.01.96

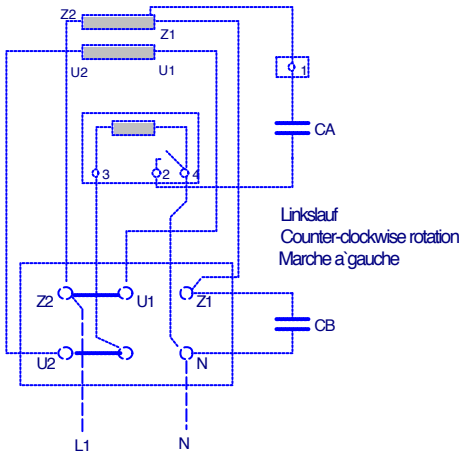




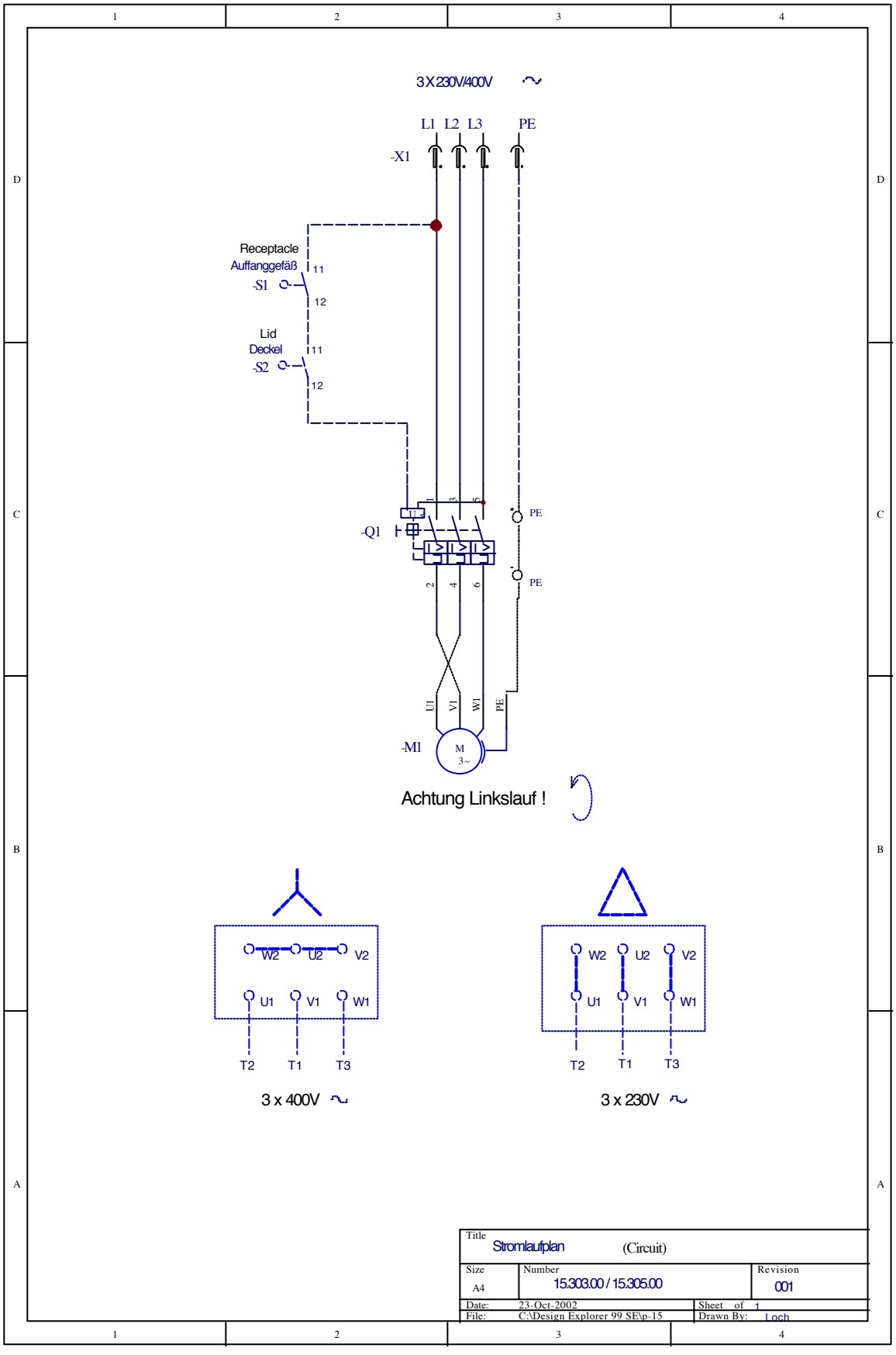
Linkslauf
Counter-clockwise rotation
Marche a`gauche

Title: Stromlaufplan (Circuit)		
Size: A4	Number: 15.301.00	Revision: 000
Date: 23-Oct-2002		Sheet of 1
File: C:\Design Explorer 99 SE\p-15		Drawn By: Loch





Title: Stromlaufplan (Circuit)		
Size: A4	Number: 15.302.00	Revision: 000
Date: 23-Oct-2002		Sheet of 1
File: C:\Design Explorer 99 SE\p-15		Drawn By: Loch



Title	Stromlaufplan (Circuit)		
Size	Number		Revision
A4	15.303.00 / 15.305.00		001
Date:	23-Oct-2002	Sheet of	1
File:	C:\Design Explorer 99 SE\p-15	Drawn By:	Loch